

REDESCRIPTION OF *BLASTOBASIS YUCCAECOLELLA* DIETZ 1910
(LEPIDOPTERA: GELECHIOIDEA: COLEOPHORIDAE: BLASTOBASINI),
WITH OBSERVATIONS ON ITS BIOLOGY

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Abstract.—A redescription of the adult of *Blastobasis yuccaeolella* Dietz 1910 is given, and for the first time the larva and pupa are described. Observations on the biology of this species are discussed. Photographs of the habitat, host plant, and dried floral parts and seed pods infested by the larva are included.

Key Words: Blastobasinae, distribution, *Yucca*

Three blastobasine moths, *Holocera gigantea* (Chambers 1876), *H. paradoxa* Powell 1976 and *Blastobasis yuccaeolella* Dietz 1910 are known to feed on *Yucca* (Agavaceae) in southwestern United States and México. *Blastobasis yuccaeolella* is known from Texas and from Nuevo León, México. Adults of this species were first reared from the seed pods of *Yucca baccata* Torrey in Texas (Dietz 1910). *Holocera gigantea* and *H. paradoxa* are known to be sympatric in at least part of their ranges, but it is unknown whether they co-occur with *Blastobasis yuccaeolella*.

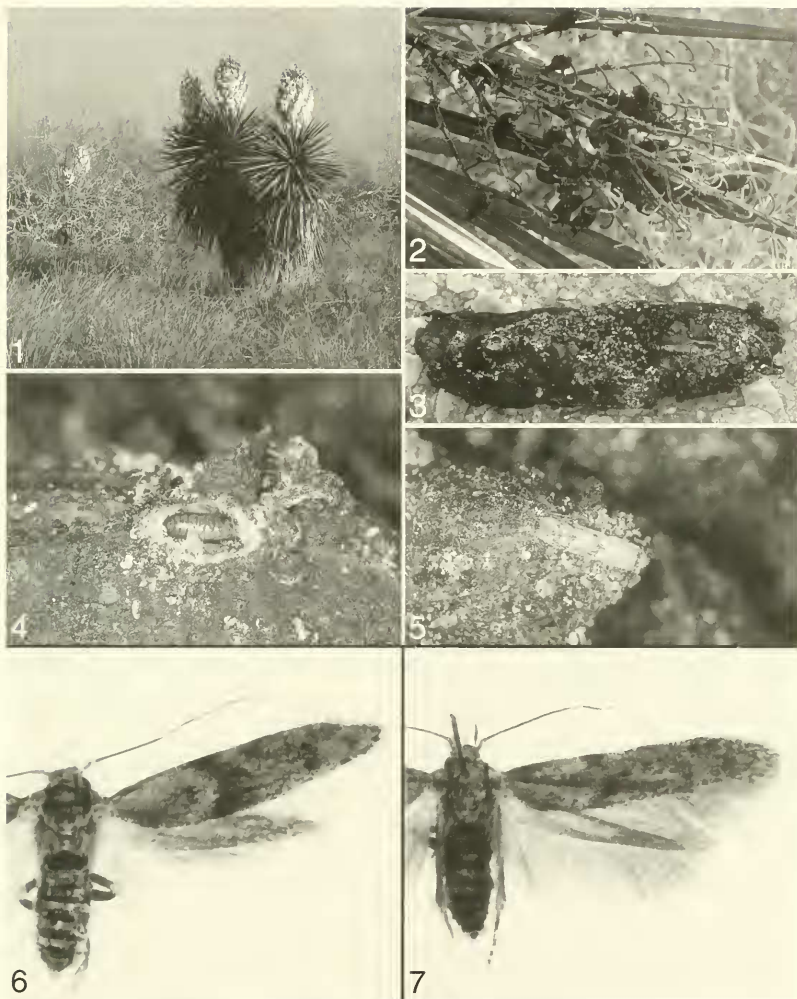
Although the Blastobasinae (Coleophoridae) are treated by Powell (1980) and Powell et al. (1999) as scavengers, several species feed primarily on living plant tissue. Here we redescribe *B. yuccaeolella* and for the first time describe the larva and pupa. In addition, the host, habitat, larval habits, and distribution of *B. yuccaeolella* are discussed.

MATERIALS AND METHODS

Larvae of *Blastobasis yuccaeolella* ranging from second to final instar were

collected from the seed pods of *Yucca treculeana* Carrière in February, March, and November between 1995–2000 from Laguna Atascosa National Wildlife Refuge, Cameron County (26°15'N, 7°21'W), and Santa Ana National Wildlife Refuge, Hidalgo County, Texas (26°02'N, 98°05'W). A single specimen was reared from *Yucca filifera* Chabaud (Agavaceae) in Baño de San Ignacio, near Linares, Nuevo León, México (24°52'N, 99°34'W). In addition, a series of specimens used by Dietz (1910) for his original description was examined at the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM). All of these latter specimens are labelled as having been collected in 1897 from *Yucca baccata* in Texas.

For SEM study, larvae and pupae were cleaned in 10% alcohol with a camel's hair brush, and dehydrated in increasing concentrations of alcohol to absolute alcohol. After dehydration, specimens were critical point dried using a Tousimis critical point dryer, mounted on SEM stubs, and coated with gold-palladium (40/60%), using a Cressing-



Figs. 1-7. Habitat, host, pupa, and adult of *Blastobasis yuccaeolella*. 1, *Yucca treculeana* and habitat in Texas. 2, Dried fruits. 3, Dried seed pod. 4, Pupa. 5, Live adult. 6-7, Pinned specimens of reared adults.

ton sputter coater. The ultrastructure of the larva and pupa was studied with an Amray 1810 scanning electron microscope at an accelerating voltage of 10 kV.

Morphological observations and measurements of the larva, pupa, and adult, were made using dissecting (reflected light) and compound microscopes (transmitted

light) with a calibrated micrometer. The Methuen Handbook of Colour (Kornerup and Wanscher 1978) was used as a color standard. Genitalia were dissected as described by Clarke (1941), except Mercurochrome and chlorazol black were used as staining agents. All pinned specimens of reared adults and lots of immature specimens were assigned voucher label and deposited in USNM.

RESULTS

Blastobasis yuccaeolella Dietz 1910 (Figs. 1-23)

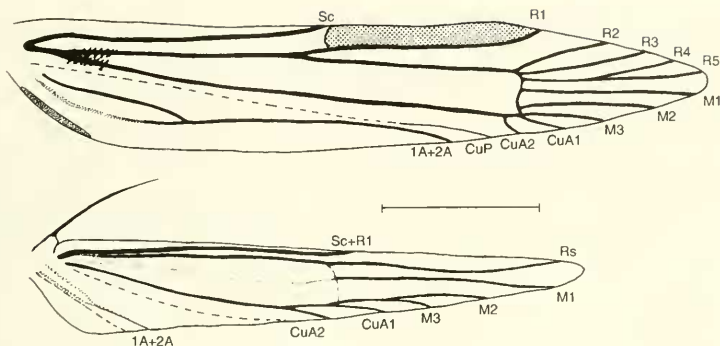
Adult.—**Head:** Scales of vertex and frontoclypeus brown tipped with pale brown, or brownish gray tipped with pale brown; outer surface of labial palpus dark brown or brown intermixed with pale brown scales to near apical area of segment II and basal and apical areas of segment III, inner surface pale brown intermixed with few brown and dark brown scales along ventral and subventral surfaces; scape of antenna with brown scales tipped with pale brown, flagellum pale brownish gray; flagellomeres wider, with longer cilia in male than in female; first flagellomere excised, forming a deep notch in male; proboscis pale brown. **Thorax:** Tegula with scales brownish gray tipped with pale gray, or pale brown basally near white distally, or pale brown basally brownish gray distally; mesonotum with scales brownish gray tipped with pale gray, or scales dark brownish gray tipped with pale gray basally, or brownish gray tipped with pale gray distally. Forewing (Figs. 6-7): Length 5.6-8.5 mm ($n = 122$): Brown scales tipped pale brown and white, intermixed with pale brown and dark brownish-gray scales; median fascia complete or incomplete; base with dark brownish-gray scales between costa and Cu_1P present or absent; cell with three dark brownish-gray spots, 1 near middle and 2 near distal end; marginal spots distinct, faint, or absent; venation with M_3 and CuA_1 branched from distoposterior angle of cell;

CuA_2 distal from CuA_1 ; undersurface brown. Hindwing: Translucent brownish gray; venation with cubitus 4-branched, each vein stalked in series and extending to posterior margin.

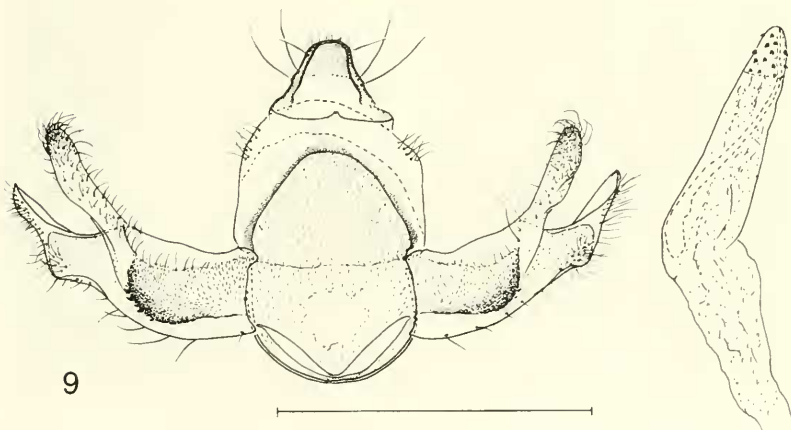
Male genitalia (Fig. 9): Uncus wider basally than long, gradually narrowed toward a rounded apex, sparsely setose dorsally, with 3 pairs of long lateral setae; gnathos a rounded ventral support for tuba analis, posteriorventral margin medially produced into a small bidentate process; vinculum wide; juxta bandlike; ventral part of valva distally emarginate ventrally near abruptly rounded base; apically produced into a spinelike process with a flat inner margin; valva with dorsal part setose, elongate, digitate, widening basally and confluent with proximal flange; proximal flange elongate, apicoventral margin rounded, with dense stout setae to margin; microtrichiate membrane across posterior margin of tegumen and margins of proximal flange; tergal setae present; aedeagus nearly straight, slightly narrowed from base to apex; sclerite of aedeagus singly twisted from midlength; anellus conical, with several stout setae.

Female genitalia (Fig. 10): Ovipositor telescopic, with 4 membranous subdivisions; eighth sternum elongate, setose along posterior margin; eighth tergum with a narrow, elongate, darkly pigmented pattern along median longitudinal axis; ostium bursae slightly posterior to seventh sternum, surrounded by sparse microspinules on surrounding membrane; seventh sternum with perpendicular notch on posterolateral margin; inception of ductus seminalis slightly anterior to ostium bursae; ductus bursae long, membranous in about posterior $\frac{1}{3}$, with rows of internal, imbricate platelets within anterior $\frac{1}{2}$; corpus bursae slightly elongate, with lobe on posterior end and hornlike signum near midlength.

Larva (Figs. 11-20).—Length 6.1-10.5 mm [$n = 39$]. Body pale violet on dorso-lateral surface, tonofibrillary platelets, areas between folds, and venter white; setae on small pinacula; prolegs with crochets on



8



9

Figs. 8-9. Wing venation and male genitalia of *Blastobasis yuccaeolella*. 8, Wing venation. Scale = 1.0 mm. 9, Male genitalia. Scale = 0.5 mm.

A3-A6 and A10. Head (Figs. 11-14, 19): Hypognathous; adfrontal sclerites slightly narrowed (Fig. 11). P1 about 4 times the length of P2, about even with apex of frons and slightly below F2; F2 above apex of frons, slightly longer than F1; C3 at least twice the length of F1; C2 in straight line with C3, and slightly above C1; A2 in straight line with and above A1, A1 and A3 at least twice length of A2; L1 laterad to

A3, about $\frac{1}{2}$ length of A3; SS3 at least twice the lengths of SS2 and SS1; SS1 slightly laterad of mandibular condyle. SS2 posterad to stemma-5; S2 about twice the length of S1 and S3; S3 lateroposterad to SS2. S2 lateroposterior to stemma-1, and S1 adjacent to stemma-3; labrum with 12 setae, 2 pair of subequal median setae in same horizontal plane and perpendicular with median longitudinal axis, 2 pair of

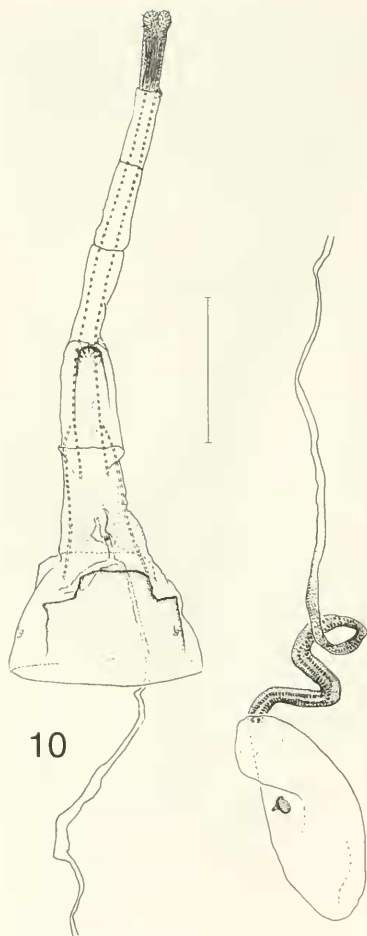
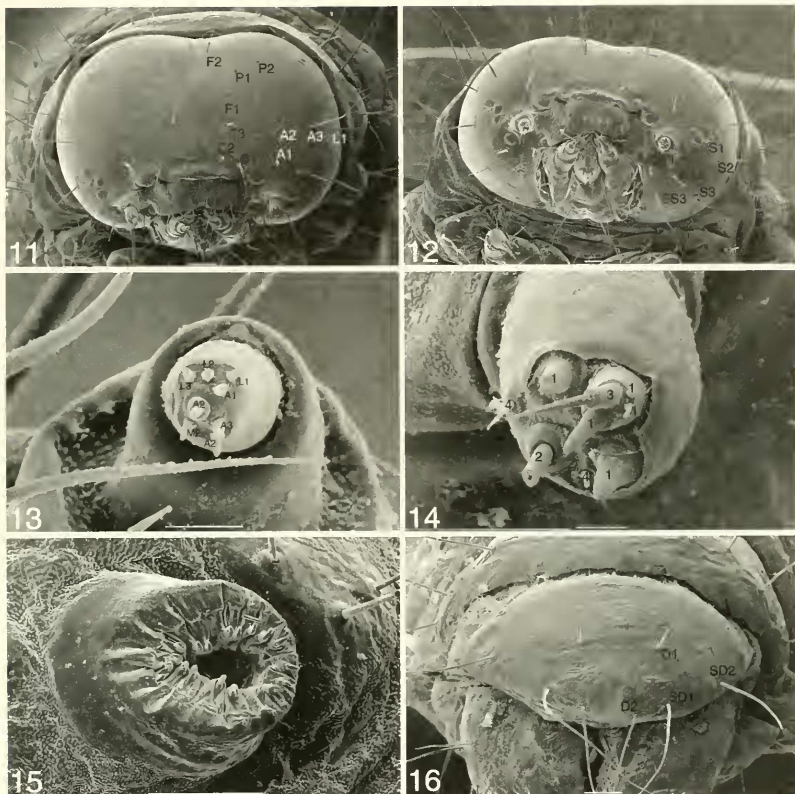


Fig. 10. Female genitalia of *Blastobasis yuccae-colella*. Scale = 1.0 mm.

equal marginal setae ventrolaterad to median setae, and 2 pair of subequal lateral setae along margin; mandible with two distinct dentitions and 2 subequal setae on ventral surface (Fig. 19); apical sensilla on maxillary palpus (Fig. 13) similar to that of

Blastobasis graminea (Adamski 1999); antennal sensilla (Fig. 14) with 2 more sensilla basiconica and 1 more sensillum trichodeum than *B. graminea* (Adamski 1999); submental pit oblong. Prothorax (Fig. 17): Shield with SD1 slightly longer than XD1 and XD2; D2 about as long as SD1, about equidistant to XD2 and XD1, and in straight line with D1; SD2 as long as or slightly longer than D1, about equidistant to SD1 and XD2, and anteriad to D2 and D1; L-group on pinaculum ventroanteriad to spiracle; L1 about twice the length of L2 and L3; SV1 slightly longer than SV2; V1's close, about $\frac{1}{4}$ - $\frac{1}{5}$ distance as V1's on T2-T3. Mesothorax and metathorax (Fig. 17): D2 about $2\frac{1}{2}$ times the length of D1; D2 and D1 on same pinaculum; D2 slightly anteriad and more than twice the length of D1; SD1 and SD2 on same pinaculum; SD1 slightly anteriad to SD2 and more than twice the length of SD2; L1 and L2 on same pinaculum, ventroanterior to pinaculum bearing SD1 and SD2; L1 at least twice the lengths of L2 and L3; L3 dorsoposterior of pinaculum bearing L1 and L2; SV1 about as long as L1, in straight line with L3. Abdomen (Figs. 15-16, 18, 20): A1-A2 (Fig. 18) with D2 at least $2\frac{1}{2}$ times length of D1, SD1 above spiracle; SD2 microscopic, on same pinaculum as SD1 (not shown); L2 and L1 on same pinaculum, beneath and slightly posteriad spiracle; L2 about $2\frac{1}{2}$ times length of L1; L3 posteroventrad of pinaculum bearing L1-L2, and in line with D2; SV-group trisetose, SV1 about $2\frac{1}{2}$ times length of SV2 and SV3; crochets (Fig. 15) unioridinal, in circle, reduced or absent laterally; A8 (Fig. 20) with SV1 in line with L3; A9 (Fig. 20) with pinaculum bearing D1-D2 orientated about 45 - 90° from pinaculum bearing L1-L2; SD1 closer to dorsal pinaculum than to lateral pinaculum; L3 proximal to SV-group setae; SV1 and SV2 on separate pinacula, SV2 posteroventrad to SV1; V-group setae slightly farther apart on A10 than on A8-A9; A10 (Figs. 16, 20):



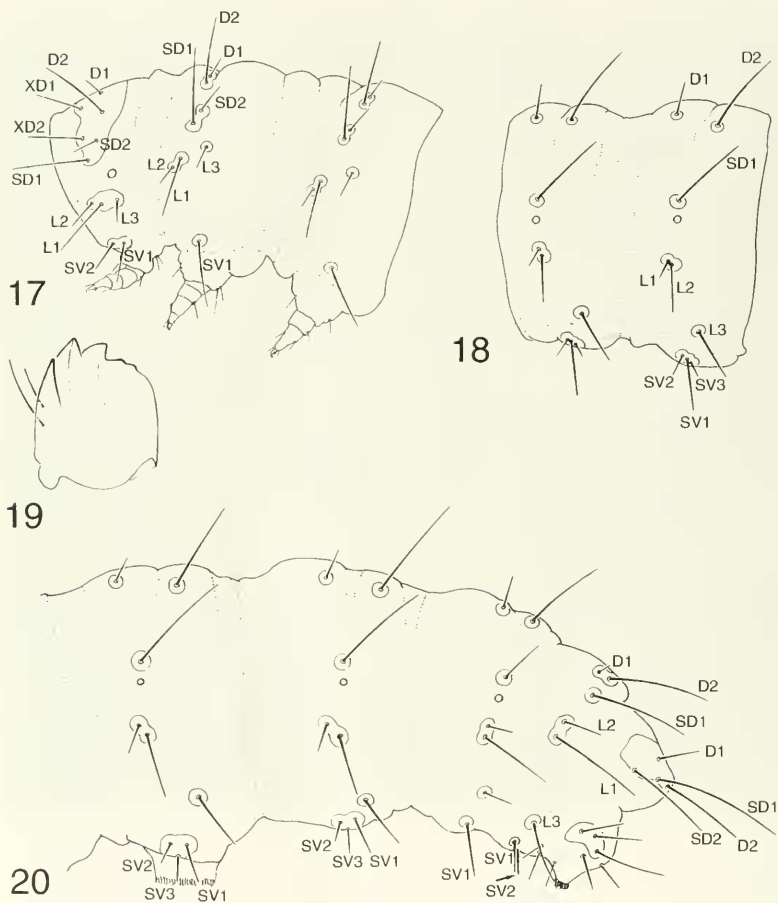
Figs. 11–16. Scanning electron micrographs of larva of *Blastobasis yuccaeolella*. 11–12, Head capsule. Scale = 100 μ . 13, Sensilla on apex of maxillary palpus. Scale = 10 μ . A2 = sensillum styloconicum; A1, A3, M1, M2, L1, L2, and L3 = sensilla basiconica. 14, Sensilla on apical portion of antenna. Scale = 10 μ . 1 = sensilla basiconica, 2 = sensillum styloconicum, 3 = sensilla chaetica, 4 = sensilla trichodeum. 15, Proleg. Scale = 100 μ . 16, Anal plate. Scale = 100 μ .

anal plate with SD2 and D2 equal in length, SD1 longest, D1 the shortest.

Pupa (Figs. 21–23).—Ovate, brownish yellow to yellowish brown; length 4.0–4.8 mm ($n = 20$); mostly smooth with shallow wrinkles throughout; frontoclypeal suture present; epicranial suture distinct; caudal part of antennae converging, separating at distal end exposing metathoracic legs; maxillary palpus present; labial palpus absent;

prothoracic leg exposed laterad to maxillary palpus.

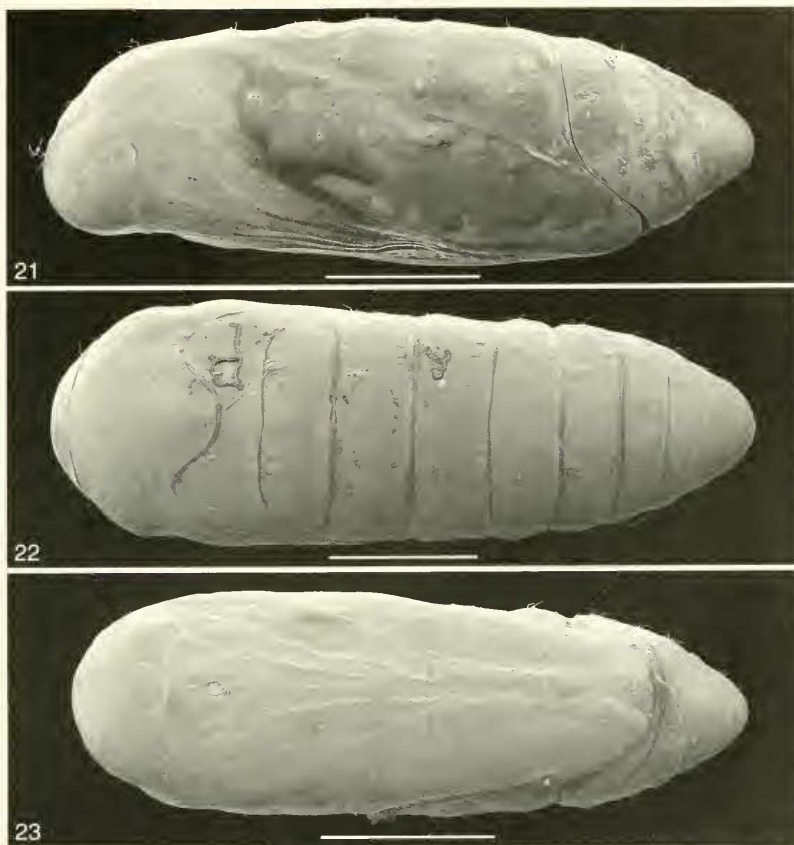
Biology.—The larvae of *Blastobasis yuccaeolella* feed on dried remains of flowers (Fig. 2) and dried seed pods (Fig. 3) that accumulate in the leaf rosette. Old fruits occasionally remain on the infructescence for one or a few years, or become wedged in the narrow groove of rigid *Yucca* leaves created by their upwardly curved edges.



Figs. 17-20. Mandible and setae maps of larva of *Blastobasis yuccaeolella*. 17, Mandible. 18, Prothorax, meso- and metathorax. 19, Abdominal segments 1-2. 20, Abdominal segments 7-10.

Larvae are found concealed underneath and inside old fruits, where they feed on the dried fleshy portions of the fruit and to a lesser extent on seeds. The feeding results in diagnostic frass beneath the fruits. Larvae also forage freely in larger aggregates of old flowers and fruits that may increase up for years and form strongly decomposed

humuslike material. Pupation takes place in a thin cocoon lined externally with frass (Fig. 4), typically located beneath old fruits or other plant parts. Adults are known to emerge between December and March or later. Most emergences take place late in the afternoon. The emerging adults are cryptic on the plant matter (Fig. 5), and tend to hide



Figs. 21–23. Pupa of *Blastobasis yuccaeolella*. 21, Lateral view. 22, Dorsal view. 23, Ventral view. Scale = 1 mm.

rather than to fly when disturbed. Adults have been observed at night in flowers.

DISCUSSION

Yucca baccata is a readily identified species, primarily distributed from New Mexico to easternmost California (Reveal 1977). The easternmost published record of *Yucca baccata* is from Crockett County, Texas, southwest of Big Lake (Webber

1953), and all other reports refer to sites west of Marathon (McKelvey 1938). The species has been observed farther east than these records 43 km W of Eldorado in westernmost Schleicher County, Texas, in the transition zone from Chihuahuan desert to the Edwards Plateau ecoregion (Pellmyr, unpublished observation). Thus, it is likely that the population of *Blastobasis yuccaeolella* from which this species was first

collected and described originated from a site within the Chihuahuan desert, in the westernmost quarter of Texas. Elevation ranges from sea level for the easternmost records, 250 m for the Mexican site, and 750 m or more for *Yucca baccata* sites in western Texas.

The characteristic habitats of *Yucca treculeana* in eastern Texas (Fig. 1) and Nuevo Leon are Tamaulipan grasslands, often interspersed by dense thornscrub (Pellmyr 1999). *Yucca baccata* occurs in several communities in westernmost Texas; so, the habitat of *Blastobasis yuccaeolella* in that area cannot be determined from available locality data.

Powell and Mackie (1966) and Powell (1984) reared *Holococera gigantella* and *H. paradoxa* from both green and dried seed pods of *Yucca whipplei* (Torrey) Trelease. In addition, *H. gigantella* was reared by Coquillett and Riley from seed pods of *Y. brevifolia* Engelmann, and Powell reared the moth from flowers of *Agave orcuttiana* Trelease (Agavaceae) (Powell 1984). *Blastobasis yuccaeolella* has not yet been reared from green seed pods of either *Yucca baccata* or *Y. treculeana*.

In general, it appears that *Blastobasis yuccaeolella* and the above mentioned holcocerine moth species that utilize *Yucca* for their larval host feed within dried seed pods, and to a lesser extent, on the stems and floral parts of the plant. The number of generations per year, timing of oviposition, and ovipositional sites are not known for *B. yuccaeolella*.

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